Fabrication and performance of high temperature segmented thermoelectric oxide-based module

Le, Thanh Hung; Pham, Hoang Ngan; Han, Li; Holgate, Tim; Van Nong, Ngo; Linderoth, Søren; Pryds, Nini

Publication date:
2013

Fabrication and performance of high temperature segmented thermoelectric oxide-based module

LE THANH HUNG, PHAM HOANG NGAN, LI HAN, TIM HOLGATE, NGO VAN NONG, SOREN LINDEROTH and NINI PRYDS
Technical University of Denmark

In order to improve the power generation performance of oxide modules, segmented p-legs of half-Heusler (HH) alloy Zr0.5Hf0.5CoSb0.8Sn0.2 to layered-colbatite Ca3Co4O9 and n-legs doped-ZnO were used. The thermoelectric properties of both single and segmented legs were characterized from 300 to 1100 K. Using these data as input parameters, segmented module was first theoretically designed by 1D numerical modeling, in which the compatibility factor of HH alloy and oxides were taken into consideration to maximize the efficiency of their segmentation. Based on the modeling strategy design, segmented modules were constructed, tested, and its performance is compared with theoretical result and with non-segmented oxide modules.